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Global Warming: A National Security Issue?

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A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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13 February 2006

Abstract

The waters in the Canadian Arctic are quickly becoming free to navigate due to global warming. When international shipping bombards the region, the United States and Canada must be ready to face the security implications that will arise. A failure to do so may leave an opening for another terrorist strike on American soil. We must also be prepared to protect our interests in the region. Focus on Arctic oil is becoming a reality as we move towards freeing ourselves from dependence on oil from the Middle East.

Preparing for operations in the Arctic must begin with a strong and cooperative relationship with our Canadian neighbors. Differences must be settled quickly—particularly the issue over the sovereignty of the Canadian archipelago. We must also understand the implications of operating in the north with respect to the indigenous population and the environment. The success of the operations in the north depends on proactive planning—now is the time.

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Introduction

An evolving phenomenon is occurring today in our hemisphere. The oceanographic reality of diminishing ice in the Arctic region is not just an environmental issue that needs to be addressed; it involves implications for the Department of Defense as well. The dynamic nature of the geo-strategic realities in northern waters calls for a dynamic plan and devoted attention. A minimal, but effective combined military footprint, comprised of American and Canadian forces, is necessary to secure the Arctic region; a failure to work together to manage and control it could result in significant breeches in the National Security posture.

The history of the Northwest Passage is as sparse as it is long. Expeditions to discover a route from the Atlantic to the Pacific began in the 16th and early 17th centuries. Spanish and English expeditions only resulted in claims to the land and surrounding waters in the Canadian Arctic. Several of the early explorer's names live on through areas in which they discovered; for example, Frobisher Bay and Hudson Bay. Interest in the region was re-kindled in the first half of the 19th century. English led expeditions all failed, often tragically. Many men died of starvation and disease as their ships became entrenched in ice.

Although the Northwest Passage was first conquered by sea in 1906 and again in 1944, the first deep-draft route was not discovered and completed until 1957 by the U.S. Coast Guard Cutter *Storis* in company with the U.S. Coast Guard Cutters *Bramble* and *SPAR*.¹ 20th century exploration of the Northwest Passage and the Arctic also included

¹ Wikipedia, last modified January 18, 2006., s.v. "Northwest passage." Available from: http://en.wikipedia.org/wiki/Northwest_Passage; Internet; accessed January 27, 2006.

submarine traffic, particularly during the Cold War. The movement of submarines in itself proves the strategic significance of the region.

The United States' interest in the region born out of the Cold War coupled with modern technological advances enabled the advent of satellite monitoring of the Polar Ice Cap in 1978. Analysis of historical data since then has showed a marked decline in the ice, as much as 18% less than what was observed at the end of the summer of 1978.

Observations show that the spring melt has been beginning earlier and lasting longer. Average temperatures are as much as 5.4 degrees Fahrenheit higher than they were 50 years ago. These trends are expected to rapidly increase as more of the ice recedes. The exposure of the sea to direct sunlight will enable it to trap radiation that would have otherwise been reflected by ice, resulting in warmer seas and less ice in the future. While estimations vary, the Northwest Passage may be completely passable for four to five months out of the year within the next five to ten years. Arctic sea ice may be completely gone within this century.²

The opening of the Northwest Passage for several months per year in the near term creates several security and law enforcement issues for the United States. This essay will attempt to hypothesize what those issues will be and how best to combat them.

Global Shipping: The Catalyst to Change

The first major effect to National Security that the opening of the Northwest Passage will create is by way of global shipping. Arctic transit presents one great advantage for the shipping industry, “an open Northwest Passage would cut over 5,000

² National Snow and Ice Data Center, “Sea Ice Decline Intensifies,” September 28, 2005 [article on-line]. Available from: http://www.nsidc.org/news/press/20050928_tendscontinue.html; Internet; Accessed January 28, 2006. The National Snow and Ice Data Center is a division of NOAA that has been monitoring the environmental trends in the Arctic since 1978.

nautical miles from shipping routes between Europe and Asia. If the passage's deep waters become completely ice-free in summer months, they would be particularly enticing for massive supertankers that are forced to plow around the tip of South America because they are too big to pass through the Panama Canal.”³

While times have changed and the United States no longer faces a Cold War threat from another great superpower, chokepoint and sea line of communication security needs to remain a high interest. Maritime transport still remains the most inexpensive means of transporting bulk goods; consequently 80% of the world’s trade involves ocean transit. In the United States, more than 95% of all foreign commerce is maritime . . . and international trade is projected to reach two billion tons within the next twenty years—twice today’s levels.⁴ If the attraction to shipping as a means for commerce is financially driven and distances are significantly reduced via the Northwest Passage, then the shipping companies’ benefits are two-fold—cargo arrives sooner and costs less to transport. With this theory in mind, not only will the Northwest Passage be used for maritime trade, it could potentially be the *most highly* used sea line of communication in the world.

While it is understood that it is necessary to maintain domain awareness in the region for safety of navigation purposes, it is not necessarily the large volume of ships that poses a direct national security risk to the United States—it is the valuable contents of those ships. While the world’s supply is somewhat fixed, demand for valuable

³ Levon Sevunts, “Northwest Passage Redux.” The Washington Times. June 12, 2005 [article on-line]. Available from: <http://www.washingtontimes.com/specialreport/20050612-12835-3711r.htm>; Internet; accessed January 27, 2006.

⁴ Donna J. Nincic, “Sea Lane Security and U.S. Maritime Trade: Chokepoints as Scarce Resources,” in *Globalization and Maritime Power*. ed. Sam J. Tangredi (Washington D.C.: National Defense University Press, 2002), 145.

commodities such as oil continue to grow. Other major chokepoints such as the Suez and the Panama Canals have been operating at full capacity for years and will nearly double by the middle of the century.⁵ The opening of Arctic waters will not only alleviate much of this traffic, it will assume most of it because of the economic advantage of shorter sailing distances.

Global trade and the economic stability of the United States will be dependant upon the security of the Northwest Passage. Finding a solution to securing the region with regard to the increased shipping at the operational level is not an easy task. Tracking all ships is possible only through presence. In order to have a total recognized maritime picture, facilities must be in place throughout the Northwest Passage. Support for these facilities will be difficult because of the harsh conditions. A feasible land-based infrastructure as well as suitable port facilities will be necessary. United States Naval and Coast Guard vessels in conjunction with our Canadian counterparts can monitor traffic, enforce laws, and interdict hostile ships or those carrying illicit cargo. These vessels will also need support. Replenishment could be done at sea, but due to the narrow features, extreme cold and potential ice floes, it may be more suitable to incorporate facilities ashore. Intermediate maintenance activities in the region would also be necessary for repair part support or technical assistance to allied Naval and Coast Guard vessels.

Another aspect of the region that is quickly drawing international attention is the increased potential for offshore oil drilling. While who claims those rights is beyond the scope of this paper, security implications directly affecting the United States will surely take hold. Keeping in mind increased tensions with Iran, the world's 4th largest oil

⁵ Ibid., 149.

producer, and President Bush's vow to diminish America's dependence on Middle East oil, importing oil from the Arctic seems to be a potentially viable solution. While it is up to the United Nations to decide who has legal claims to different areas of the seabed, operationally the United States military should begin relations now with those nations involved—namely Russia, Denmark, Canada, and Norway to provide security and law enforcement for a budding industry in the north.

Perennially warmer temperatures would also affect established oil companies on mainland Alaska and Canada, forcing them to look to the sea to extract their resources. "Land access to energy reserves would likely be restricted due to a shorter period in which the ground is frozen hard enough to support heavy drilling equipment."⁶ The opening of sea routes would alleviate this problem, but further magnify the need for security and monitoring of the region.

Piracy and Maritime Terrorism: Is it a Threat?

A potential security issue for increased traffic in Northern waters is piracy. A dramatic increase in land based infrastructure and industry in the Northwest Territories and other northern lands such as Greenland and Russia may potentially give modern day pirates ports in which to operate from. "Pirates prey on all types of ships, from luxury yachts to fishing trawlers, to oil and chemical tankers."⁷ Merchant vessels make easy targets because of their small crew and general isolation. The lure of adventure may bring tourists or other individuals with many valuables to the region that would be

⁶ Tom Dogget, "Global Warming Exposes Arctic to Oil, Gas Drilling," *Common Dreams News Center*, November 9, 2004 [article on-line]. Available from: <http://www.commondreams.org/headlines04/1109-06.htm>; Internet; Accessed January 27, 2006.

⁷ Zoltan Istvan, "Piracy Rises Again on the High Seas, Study Says," *National Geographic Today*, December 19, 2002 [article on-line]; available from: http://news.nationalgeographic.com/news/2002/12/1219_021219_tvpiracy.html; Internet; accessed February 3, 2006.

virtually helpless in an ungoverned region. Admittedly, piracy in the region seems very unlikely in the near-term because of the harsh climate and lack of escape routes landward. The security issue of piracy lies in the long-term when sufficient civilization is in place to allow pirates potential means of escape or ability to meld back into society. Nevertheless, allowing hundreds of thousands of square miles of navigable waterways to go ungoverned—without a contingency plan for combating piracy in the future would be foolish.

A more prevalent security issue that should immediately factor into planning for operations in northern waters is combating terrorism. Assessment of critical vulnerabilities in the region is necessary to properly plan anti-terrorism operations. All contingencies must be planned for and defended against because of the inherently unconventional nature of terrorist acts and in light of the aftermath of 9/11. “Despite it being known that [the] idea of an unconventional terrorist operation mounted from the air was engaging the attention of various terrorist groups, the counter-terrorism agencies of the world did not pay much attention to evolving appropriate civil-aviation counter-terrorism techniques and strategy to deal with new types of situations, which could arise. Apart from strengthening the physical security infrastructure of the airports, nothing further was done. The result: 9/11. We should not repeat the mistake of maritime terrorism.”⁸ Valuable infrastructure for a budding oil industry regardless of the nation that owns it would likely be a target. Bases in the region are an obvious target. Transit lanes themselves are also vulnerable to terrorism due to the relative distance of ships and the close proximity to land.

⁸ B. Raman, “Maritime Security & Maritime Counter-terrorism,” *South Asia Analysis Group paper no. 1176*, December 6, 2004 [article on-line]; Available from: <http://www.saag.org/papers12/paper1176.html>; Internet; Accessed February 3, 2006.

The threat of maritime terrorism is very prevalent; “According to the Lloyd’s list, the U.S. and Norwegian intelligence agencies have identified some 15 to 23 freighters, flying the flags of Yemen, Somalia, and the Pacific island of Tonga . . . as owned by the Al-Qaeda network.”⁹ Al-Qaeda sponsored vessels in the Northwest Passage raises a concern over the proliferation of weapons of mass destruction (WMD). In order to disrupt international trade of such materials, NATO has enacted the “Proliferation Security Initiative (PSI) . . . [which] aims to disrupt and deter the illicit trade in WMD by searching ships . . . suspected of carrying nuclear, chemical, or biological weapons, or materials that could be used to make them.”¹⁰ The onset of shipping in the Arctic region would likely raise this concern and would require joint visit, board, search, and seizure training to accustom the Navy and Coast Guard to extreme cold weather conditions.

Shaping the Environment: Not Just a Threat Assessment

Training for and coordinating joint operations to fight piracy and combat maritime terrorism are done in all Combatant Commands; lessons learned could easily be applied to planning for those elements in northern waters. What is not common is the integration with the local populace. Because of the immature nature of the region, integrating the indigenous people into operational planning early is a necessity; failure to do so would likely result in resentment and eventually, larger political problems. An increased presence in the region would directly impact the indigenous population—the Inuit people. Inuit is a collective name for the indigenous people of Alaska, Russia, Greenland, and provinces in Canada—primarily the Northwest Territories, Quebec, and

⁹ Ali M. Koknar, “Maritime Terrorism: A New Challenge for NATO,” in *Institute for the Analysis of Global Security—Energy Security*, January 24, 2005 [article on-line]; available from:

<http://www.iags.org/n0124051.htm>; Internet; Accessed February 3, 2006.

¹⁰ Ibid.

Labrador. They are a coastal people that rely on the sea for their livelihood. What is immediately evident about this group is that they are very well organized and do have a collective political voice. The Inuit Tapiriit Kanatami (ITK) is Canada's National Inuit Organization. The objectives of the ITK are the same as they were when the organization was formed in 1971. The aims of the ITK are to speak as one voice in government and preserve the unity of all Inuit on all matters regional, national, and international. The ITK aims to represent all Inuit on matters of their settlement claims; to remain self-governed individuals; to protect the environment and their culture, and to foster economic development.¹¹

Inuit involvement in Canadian government has proven fruitful in the last thirty years. Between 1992 and 2005, all Inuit people achieved regional autonomy through legislation granting claims to their ancestral lands.¹² Much of Inuit involvement in government now deals with the environmental issues such as global warming and the effects on the wildlife, which for 5,000 years has been their livelihood.

A joint effort to secure the Northwest Passage would likely have to keep Inuit concerns in mind. Not only is respecting Inuit land claims mandated by Canadian law; it is simply the right thing to do. Joint Civil Affairs Operations would be necessary to gain the trust of the local people and make an American presence in the region a positive one. Community relations projects to help repair/build schools, hospitals, or other facilities beneficial to the Inuit would go a long way to an initial acceptance of an American presence and eventually mutual cooperation.

¹¹ Inuit Tapiriit Kanatami, "Aims and Objectives," [article on-line]; available from: <http://www.itk.ca/corporate/aims-objectives.php>; Internet; accessed February 6, 2006.

¹² Wikipedia, last modified February 5, 2006. s.v. "Inuit" Available from: <http://en.wikipedia.org/wiki/Inuit>; Internet; Accessed February 6, 2006.

Incorporating local Inuit knowledge could also prove valuable to shaping the environment. Sheila Watt-Cloutier, Chair Inuit Circumpolar Conference, calls the Inuit people the mercury in the globe's barometer, referring to the Arctic.¹³ Although she was speaking from an environmentalist perspective, the value of the analogy cannot be overlooked with regard to security implications. Inuit hunters and elders are reporting "melting permafrost causing beach slumping and coastal erosion, longer sea-ice free seasons, new species of birds and fish . . . invasions of mosquitoes and blackflies, [and] unpredictable sea-ice conditions."¹⁴ This information is valuable for two reasons: local observations verify scientific findings and vice versa; and it exposes the value of the perception of the Inuit, a perception that could be of immeasurable importance to an operational planner.

Since a military presence is necessary in the Canadian Arctic and a meaningful symbiotic long-term relationship with the Inuit is essential, then building schools and fixing roads is not enough. While these improvements create lasting dividends and allow the military the benefit of a positive first impression, it will only take one major disaster to immediately turn the military into an unwelcome intruder. The most likely catastrophic event that would hinder plans for shaping the security posture in the region is of an environmental nature—excessive damage to natural habitat of Arctic wildlife or an oil spill.

While it is certainly not the business of the military to make the environment a major priority, it is necessary in this case to ensure that programs are in place to protect

¹³ Sheila Watt-Cloutier, "The Arctic: Its people and Climate Change," (lecture presented to the Institute of the Environment, University of Ottawa, September 21, 2005), Inuit Circumpolar Conference, last modified November 21, 2005. Available from: <http://www.inuitcircumpolar.com/index.php?ID=308&Lang=En>; Internet; Accessed January 31, 2006.

¹⁴ Ibid.

the Arctic. A small but effective military footprint would go a long way to ensure that operations in the region are not blamed for any further detriment to nature. What can be done is to utilize the Canadian and United States Coast Guards to police container and cargo ships to uphold environmental laws. Working hand in hand with safety supervisors on offshore oilrigs would also be beneficial to ensure proper measures are in place. Utilizing alternate forms of energy such as solar and wind-power would also be valuable in a very environmentally conscious region. Helping to build a solar and wind-power energy infrastructure for potentially growing industries in the region would also enhance the image of the military presence. Other maritime programs to display the environmental conscious of the military are enforcing fish havens, exclusion zones for migratory wildlife, and developing a procedure for reporting sightings of endangered or protected sea-going wildlife. While remaining environmentally responsible is a small part of the overall operations, it is essential to understand that any future success based on popular support depends on a zero defect policy.

Solution: Joint Effort

Perhaps the most potent and relevant issue facing America with regard to Arctic waters, specifically the Northwest Passage, are relations with Canada. We share an intertwined relationship in all aspects. Canada and the United States are the two largest trading partners in the world, we have a “long tradition of fighting together to defend common values and ideals,”¹⁵ we have the same priorities with regard to national security—post 9/11, and we are partners on environmental issues. All four of these traits are pertinent when preparing for climate changes in the Arctic region.

¹⁵ Department of Foreign Affairs and International Trade, *A Unique and Vital Relationship* last modified January 24, 2006. Available from: http://www.dfaid-maeci.gc.ca/can-am/main/front_page/relationship-en.asp; Internet; Accessed February 1, 2006.

According to the Canadian Department of National Defense (DND), Canadian security is the first priority of the forces. Re-organization will occur in order to more effectively respond to domestic crises and to support other departments within the government. In 2005, Canada approved the largest defense budget increase in a generation and plan to vastly improve their forces through recruitment and materiel.¹⁶

The Department of Foreign Affairs and International Trade (DFAIT) has similar priorities. They recognize the relationship with the United States is a necessity with regard to security, and that fighting terrorism is a top priority. The DFAIT also recognizes the validity of long-standing organizations such as NORAD, NATO, and the UN. The DFAIT is a much broader governmental institution than the DND. Not only are they concerned with Canadian security, they recognize a partnership for economic growth, energy, border security, and environmental issues.

Both the DND and the DFAIT must prove to be integral in any operational planning initiatives. Common interests and long-standing relationships must be fostered in order to solve security issues in northern waters. The United States cannot attempt to secure the Arctic, particularly the Northwest Passage, unilaterally due to the fragile nature of the subject to the Canadian people. While branches of the government such as the DND and the DFAIT have cooperated extremely well in our vital relationship, the exception truly is the question of the sovereignty of the Canadian archipelago; whether or not the waters within the islands are inland waters or international straits, free to all transit. The United States, among others, contends that the Northwest Passage is international waters while Canada staunchly disagrees. The most recent event reflecting

¹⁶ Department of National Defense, *Defense Policy Statement*, last modified May 12, 2005. Available from: http://www.forces.gc.ca/site/Reports/dps/index_e.asp; Internet; Accessed February 1, 2006.

the controversy was a report to the Canadian public that the USS Charlotte “cruised through the Arctic Ocean . . . [and] probably pass[ed] through Canadian territorial waters.”¹⁷ The report occurred as Canada prepared for its elections and was certainly an important issue across the country. In Prime Minister Stephen Harper’s first press conference after being elected January 23rd, he spoke strongly for Canada on the topic. David Wilkins, Washington’s ambassador to Canada, made the statement that it would be ill advised on Canada’s part to militarize the Northwest Passage since they are international waters. In response, Harper stated that “The United States defends its sovereignty; the Canadian government will defend our sovereignty. It is the Canadian people that we get our mandate from, not the ambassador of the United States.”¹⁸

It is clear by Harper’s statement and the profound nature of the fact that it was from the new Prime Minister’s very first press conference that the subject is tenuous; it is necessary to note that Canada does recognize the need to secure and monitor the region. Harper’s “Canada First” initiative is the first major step towards that end. In a December 2005 speech, Harper outlined the specifics to militarize the Canadian Arctic “in order to ensure sovereignty over . . . land, waters, and airspace in Canada’s north.”¹⁹ The premise of the militarization is to “make it plain to foreign governments—including the United States—that naval vessels traveling in Canadian waters will require the consent of the

¹⁷ Chris Wattie, “U.S. Sub May Have Toured Canadian Arctic Zone,” *National Post*, December 19, 2005 [article on-line]. Available from: <http://www.canada.com/nationalpost.story.html?id=fb21432a-1d28-415eb323-ceb22d477732&k=69493>; Internet; Accessed February 8, 2006.

¹⁸ Thomas Walkom, “Harper’s Arctic Stand Makes for Grand Politics,” *The Toronto Star*, January 28, 2006 [article on-line], quoting Stephen Harper, (January 26, 2006). Available from: http://www.thestar.com/NASApp/cs/ControlServer?pagename=thestar/Layout/Article_Type1&c=Article&cid=113840433055&call_pageid=101231993221&col=1012319928928; Internet; Accessed February 1, 2006.

¹⁹ Stephen Harper, (Lecture given in Winnipeg, December 22, 2005), quoted in Stand up for Canada, *Harper Stands Up for Arctic Sovereignty*. Available from: <http://www.conservative.ca/1004/3622/>; Internet; Accessed February 1, 2006. Harper is using the issue of the sovereignty of the Canadian Archipelago as part of his campaign for Prime Minister. He has since carried over his convictions towards the issue in later speeches after his election.

government of Canada.”²⁰ This argument is narrowly focused and does not see the larger ramifications of global trade infiltrating the region. At least there seems to be an agreement that a permanent military presence is finally necessary in the Canadian Arctic and this common ground should be groomed into a joint effort. While disagreements over the sovereignty of the region are strong and reach all levels of public and political life in Canada, if the argument for a joint effort for security and defense of the region is framed in such a way that it is for the common good of both nations, progress can be made toward that end. In order to show Canadians that we are not simply infringing on their sovereignty just for the sake of doing it and that it is in the best interest of all people in North America to secure the northern waters through a combined effort, we must begin now. Using NORAD as an example can defend that argument best.

With the establishment of NORAD in 1958, the United States and Canada began a defense partnership to monitor and defend North American airspace. NORAD has been a successful deterrent and first line of defense for over 50 years. “NORAD uses a network of ground-based radars, sensors and fighter jets to detect, intercept, and if necessary, engage any threats to the continent. These fighters consist of Canadian CF-18s and United States’ F-15s and F-16s. NORAD also receives surveillance data from the United States Space Command on potential threats from outer space.”²¹ While its headquarters are located in Colorado, its surveillance and control of airspace are divided into three regions—one in Canada, one in the continental United States, and one in Alaska. Over fifty radars provide a trip-wire across the entire continent, including the Arctic.

²⁰ Ibid.

²¹ Department of National Defense, *NORAD*, last modified June 7, 2005 [public record on-line]. Available from: http://www.forces.gc.ca/site/focus/canada-us/bg00.010_e.asp; Internet; Accessed February 1, 2006.

Using NORAD as a model of success of bi-national defense cooperation, a similar structure for maritime operations needs to be agreed upon. A network of surface radars can be set in place to monitor all navigable waterways out to 500 nautical miles from the coasts. Regional surveillance and control facilities can be set in place. United States and Canadian Coast Guard and Naval vessels can monitor, track, provide protection, deter aggressors, and interdict as necessary; all of these efforts should be coordinated from a central headquarters at NORTHCOM. In order to further demonstrate the good intentions of the United States with regard to the common interest of national defense from the sea and to alleviate the tension of the sovereignty dispute, it cannot be stressed enough that this should be a bi-national joint effort.

In order to do so, training and education efforts need to increase. The distinct and unfamiliar climate of the Arctic and the environmental fragility of the region call for the need to develop opportunities for those with the knowledge of the area to shape bi-national exercises—whether it be at sea or in the classroom. Sharing information now is necessary in order to begin acquisition programs specifically geared towards the Arctic climate, to understand the threat, and all the potential results of perennially warmer temperatures in the region. Because an increase in international transit of the Northwest Passage is just a few years away and because of the ongoing disagreement of the sovereignty of the region, this initial corroboration should deal with topics most likely to occur in the near-term.

Conclusion

Following environmental trends combined with an understanding of global trade, the threats therein, and the geo-strategic significance of the Arctic undoubtedly calls for

immediate attention. We are only a generation away from seeing a massive influx of transit into the region. This influx will soon be followed by industrialization of an immature part of NORTHCOM's theater. While debates over economic zones and the rights to the seabed among Arctic nations and global warming itself make the headlines, it is the national security implications that will remain in the background until a breech occurs. It is necessary to be proactive to prevent terrorist actions from reaching our shores via the Northwest Passage. It is essential to understand that the potential for American dependence on Arctic oil is a reality, particularly in light of unrest in the Middle East.

With the election of the new Prime Minister has come forceful concerns and a definite dedication on the part of the Canadians to secure what they feel is rightfully theirs. It seems we are heading in the wrong direction towards an agreement over the sovereignty of the region. Procrastinating through disagreements and debate with our next-door neighbor is dangerous. Freedom of navigation operations are valuable to enforce international law, but diplomatic measures and face-to-face conversations will produce better results in this case.²² Only a small American presence in the region will be sufficient, but steps towards cooperation with our Canadian partners must begin now to ensure the success of our common interests and the safety of our people.

²² Diplomatic measures and face-to-face conversations refer to military talks at the Combatant Commander level in this case.

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